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LUNG CANCER AND CIGARETTES

THE ASSOCIATION observable between the practice of cigarette-smoking an the incidence of cancer of the lung, to which attention has been actively, or even vehemently, directed by the Medical Research Council Statistical Unit, has been interpreted, by that Unit, almost as though it demonstrated a casuals connection between these variables.

The suggestion[1], among others that might be made on the present evidence, that without any direct causation being involved, both characteristics might be largely influenced by a common cause, in this case the individual genotype, was indeed rejected by one writer[2], although I believe that no one doubts the importance of the genotype in predisposing to cancers of all types.

It seemed to me that although the importance of this factor had been overlooked by the Unit in question, it was well within the capacity of human genetics, in its current state, to examine whether the smoking classes, to which human beings assign themselves, such as non-smokers, cigarette smokers. pipe smokers, cigar smokers, etc, were in fact genotypical differentiated, to a demonstrable extent, or whether, on the contrary, they appeared to be genotypical homogeneous, for only on the latter view could causation, either of the disease by the influence of the products of combustion, or of the smoking habit by the subconscious irritation of the postulated pre-cancerous condition, be confidently inferred from the association observed.

The method of inquiry by which such differentiation can be recognized is the same as that by which the congenital factor has been demonstrated for several types of disease, namely[3], the comparison of the similarities between monozygotic (one-egg) and dizygotic (two-egg) twins respectively; for any recognizably greater resemblance of the former may be confidently ascribed to the identity of the genotypes in these cases.

I owe to the generous co-operation of Prof. F. Von Verschuer and of the Institute of Human Genetics of the University of Munster the results of an inquiry into the smoking habits of adult male twin pairs on their lists.

The data so far assembled relate to 31 monozygotic and 31 dizygotic pairs, from Tubingen, Frankfurt and Berlin. Of the first, 33 pairs are wholly alike qualitatively, namely, 9 pairs both non-smokers, 22 pairs both cigarette smokers and 2 pairs both cigar smokers. Six pairs, though closely alike, show some differences in the record, as in a pair of whom one smokes cigars only, whereas the other smokes cigars and sometimes a pipe. Twelve pairs, less than one-quarter of the whole, show distinct differences, such as a cigarette smoker and a non-smoker, or a cigar smoker and a cigarette smoker.

[1] Fisher, R. A., *Brit. Med. J.*, ii, 43, 297 (1957).
[2] McCurdy, R. N. C., *Brit. Med. J.*, ii, 158 (1957).
[3] Von Verschuer, F., *Proc. Roy. Soc.*, **B**, **128**, 62 (1939).

By contrast, of the dizygotic pairs only 11 can be classed as wholly alike, while 16 out of the 31 are distinctly different, this being 51 per cent. as against 24 per cent. among the monozygotic.

The data can be rearranged in several ways according to the extent to which attention is given to minor variations in the smoking habit. In all cases, however, the monozygotic twins show closer similarity and fewer divergences than the dizygotic.

There can therefore be little doubt that the genotype exercises a considerable influence on the smoking and on the particular habit of smoking adopted, and that a study of twins on a comparatively small scale is competent to demonstrate the rather considerable differences which must exist between the different groups who classify themselves as non-smokers, or the different classes of smokers. Such genotypical different groups would be expected to differ in cancer incidence; and their existence helps to explain such oddities as that pipe and cigar smokers should show much less lung cancer that cigarette smokers, while among the latter, the practice of inhaling is associated with less, rather than with more cancer of the lung.

Dr. Bradford Hill, while admitting that the evidence of association found by his Unit did not amount of proof of causation, has emphasized that he does not know what else it can be due to. The facts here reported do show, however, that the choice is not so narrow as has been thought.

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